



## **Sustainable Architecture and Design to Address Acute Water-stress, Energy Delivery, Health and Socio-economic Development in Sub-Saharan Africa**

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# Sustainable Design and Shared Space: Addressing acute water-stress, energy delivery, health and socio-economic challenges in Sub-Saharan Africa

GCRF Pump-Priming Award Final Project Report  
13<sup>th</sup> April 2018



CST: Centre for Sustainable Technologies

NIBEC: Nanotechnology and Integrated Bioengineering Centre

# *Sustainable Design and Shared Space (SDSS)*

GCRF Pump-Prime Funding: Ulster University, ATOPIA Research, Ghana Council for Scientific and Industrial Research

93141R-Final Project Report 13<sup>th</sup> April 2018

Project PI, Dr Saul M Golden

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## 1.0 EXECUTIVE SUMMARY: PROJECT OVERVIEW & KEY OUTCOMES

# ***Sustainable design addressing acute water–stress, energy delivery, health and socio–economic challenges in Sub–Saharan Africa.***

*Global Challenges Research Fund (GCRF)  
Ulster University Pump-priming.*

This project links architecture and design with sustainable energy and water–security infrastructure in urbanising areas of Sub-Saharan Africa; a partnership between Ulster University, ATOPIA Research, and the Council for Scientific and Industrial Research–Institute for Industrial Research in Ghana. The project aims to build a cross-disciplinary team to fund, develop and evaluate innovative urban and building design approaches to integrate low-cost rain-water harvesting and decontamination, sanitary waste provision, and off-grid PV electricity within new or retrofit urban settlements. It will aid the welfare of rural, urban-edge, and inner-city communities by tackling basic survival needs and inequality through improved access to resources within collective, inclusive spaces for living, learning, and economic opportunity.

### ***Project Timeline***

**November – December 2017**  
Project/New Partnership Launch

**January – February 2018**  
Scoping visits in Europe and Ghana  
Establishing project focus and  
Commissioning primary research.

**March 2018**  
Stakeholder and Site Research  
Targeted visits- Ghana  
Partner/Team Meetings – Belfast  
Final Project Workshop - Accra

### ***The Project Team***

- PI **Dr Saul M Golden**  
Ulster University, Lecturer in Architecture and Spatial Design, UK  
*Built Environment Research Institute*
- CI **Dr Francis Boateng Agyenim**  
Council for Scientific and Industrial Research, Director, Ghana  
*Institute of Industrial Research (CSIR-IIR)*
- CI **Dr Mervyn Smyth**  
Ulster University, Reader in Solar Thermal Technologies, UK  
*Centre for Sustainable Technologies (CST)*
- CI **Professor John Byrne**  
Ulster University, Professor of Photocatalysis  
*Nanotechnology and Integrated Bioengineering Centre (NIBEC)*
- CI **Dr Pilar Fernandez Ibanez**  
Ulster University, Lecturer in Engineering Science, UK  
*Nanotechnology and Integrated Bioengineering Centre (NIBEC)*
- CI **Professor David Turnbull**  
ATOPIA Research/PITCHAfrica, Design Director, USA, France, UK
- CI **Professor Jane Harrison**  
ATOPIA Research/ WATERBANKS, Director, USA, France
- CI **Dr Michael Brennan**  
Ulster University, Senior Lecturer in Strategic Management  
Department of Management, Leadership and Marketing



Project outcomes as of close of pilot-project on 30<sup>th</sup> March 2018

The Sustainable Design and Shared Space project has finished within budget and has successfully,

1. Established new international partnerships to develop future grant bids between Ulster University's Faculties of Computing, Engineering, and the Built Environment (CST, NIBEC, BERI); Arts, Humanities and Social Sciences (RIAD); The Institute for Industrial Research, Accra; The Kwame Nkrumah University of Science and Technology, Kumasi; Black Star Energy/Energicity, Kumasi and Washington, D.C.; Mustard Architects, Accra; and NGO Just Ghana Ltd, London/Accra.
2. Collected a new body of primary and secondary data on Ghana's resources and infrastructure, relative to global challenges for sustainable communities, design, health, & socio-economic need.
3. Identified rural-village development sites for community-engagement & research on the benefits of integrating low-tech energy/water solutions with existing local building/farming investment.
4. Developed on-the ground support from local communities and Government MPs for future work.
5. Agreed a pilot project and team actions to develop further grant applications in 4-6 months.



Figure 1: Ghana & Africa context; Ghana Provinces & Partner sites; Key focus areas in Kumasi & Accra (SDSS 2018)